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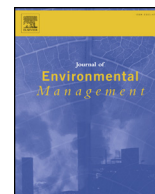
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Research article

The case of conflicting Finnish peatland management – Skewed representation of nature, participation and policy instruments

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ABSTRACT

Peatlands that are close to a natural state are rich in biodiversity and are significant carbon storages. Simultaneously, peat resources are of interest to industry, which leads to competing interests and tensions regarding the use and management of peatlands. In this case study, we studied knowledge–management interactions through the development of participation and the resulting representation of nature (how nature was described), as well as the proposed and implemented conservation policy instruments. We focused on the years 2009–2015, when peatland management was intensively debated in Finland. We did an interpretative policy analysis using policy documents (Peatland Strategy; Government Resolution; Proposal for Conservation Programme) and environmental legislation as central data. Our results show how the representation of nature reflected the purpose of the documents and consensus of participants' values. The representation of nature changed from skewed use of ecosystem services to detailed ecological knowledge. However, simultaneously, political power changed and the planned supplementation programme for peatland conservation was not implemented. The Environment Protection Act was reformulated so that it prohibited the use of the most valuable peatlands. Landowners did not have the chance to fully participate in the policy process. Overall, the conservation policy instruments changed to emphasize voluntariness but without an adequate budget to ensure sufficient conservation.

1. Introduction

In the northern hemisphere peatlands cover 350 million hectares (Strack, 2008). Peatlands are significant carbon storages, but they also emit greenhouse gases depending on temporal variation and management (Strack, 2008). Management of peatlands can be regulated on the national level by policy instruments that can prevent actions that alter nature, and they can decrease the harmful effects or improve the state of nature. Different policy instruments form combinations (Doremus, 2003). For example, current protected areas alone would not ensure conservation goals, but multiple conservation actions - focusing on ecological connectivity, restoration, management of natural resources, partnering and informing - are also needed for increasing the effectiveness of conservation (Liberati et al., 2016). Voluntary policy instruments have become more common, partly because of dissatisfaction with regulation (Jordan et al., 2003), and because of tensions between the rights of land owners and conservation needs. While mandatory instruments can produce more effective results, they often lack

acceptability (Kamal et al., 2014). However, with voluntary instruments the selection of sites is not (only) based on conservation values. There is limited research on how a combination of nature conservation instruments are selected on the national level and how they are implemented during a policy process.

Discussions on nature reflect different aspects of nature; these representations may be human or nature centric. In this article, we use the concept of the representation of nature to focus on how nature is described and reflected in policy documents. Representation means the description of someone or something in a particular way. Representation of nature can refer to actual drawings and how our understanding of nature depends on them (Charmantier, 2011) or to more abstract social constructions of nature such as metaphors (Kwa, 1987). Different representations of nature are based on various knowledge types, and thus reflect different understandings of nature including those based on ecological and social sciences or layman knowledge. In this article, we explore the role of ecological knowledge in nature representations. In ecology, the generally used representation

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of biodiversity divides it into genetic diversity, species diversity and habitat diversity (Wilson, 1988). An alternative representation of nature – a concept of ecosystem services – was formed to make nature's benefits to humans more understandable to decision makers (Costanza et al., 1997; Jordan and Russel, 2014; Millennium Ecosystem Assessment, 2003).

Conservation science has approached the link between knowledge and management with the concept of the research–implementation gap, which means for example that a network of priority conservation areas has been scientifically selected, but the network has not been established in practice (Knight et al., 2008; Sutherland et al., 2004). This problem has been addressed with operational models like the Systematic Conservation Planning in order to improve the use of scientific knowledge in practice. However, the underlying linear science transfer model, which describes that scientific knowledge is transferred into practical actions, has been criticized because it undervalues power and does not consider the fact that science is socially embedded (van Kerkhoff and Lebel, 2006). Social embeddedness means, for example, that a shared understanding of nature between scientists and policy-makers can help to gain funding from policy to research programmes (Kwa, 1987). Increased knowledge of environmental degradation and communicating this knowledge to decision makers has led to legal commitments to multilateral environmental protection (Haas, 2004). However, choosing policy instruments is not (only) a question of ecological knowledge as there are multiple simultaneous objectives for policy, including democracy, freedom of individuals, the common good and individual profit. Often actors have different values regarding nature and therefore different interests in how to use the land. Participation in decision-making for environmental management can increase legitimacy, improve design, integrate various interests, optimize implementation, increase public acceptance and foster social learning (Luyet et al., 2012). In practice, policy solutions are defined by the most powerful actors (Juntti et al., 2009). Power relationships may fluctuate or be unclear, and different groups can use different types of knowledge to support their aims. The use of evidence in policy processes is complex and dynamic (Adams and Sandbrook, 2013), and the links between the representation of nature in policy documents and policy instruments need more empiric exploration.

Designing Finnish peatland policy is an example of political controversy between natural resource use and preservation of pristine ecosystems; a policy process where the need for conservation supported by ecological knowledge and the importance of voluntary participation have been simultaneously highlighted. We studied Finnish peatland conservation between 2009 and 2015, when policy priorities evolved and peatland policy underwent intense changes. Through this case study, we aimed to increase understanding of conservation policy processes. We focused on the following research questions:

- 1) What kinds of representations of nature did the policy process produce?
- 2) What kinds of combinations of policy instruments did the policy process produce?
- 3) How did the participants comment on potential implications of instrument combinations for nature and management?

2. Materials and methods

2.1. Case - peatland management in Finland

Peatlands are defined as areas where there is an over 30 cm thick layer of peat on the surface. They are wetlands where partially decomposed organic material forms peat in the absence of oxygen. Peatlands are hydrological entities within rain catchment basins and therefore drainage or extraction in one part can alter the whole peatland area. More than two thirds of the Finnish carbon reservoir is estimated to be in peat (Turunen, 2008). About a third of Finnish land

cover is peatland, but the area of peatland habitats has decreased and their quality has been degraded (Rassi et al., 2010). About 1.2 million hectares i.e. 13% of Finnish peatlands are conserved. The conservation status of peatlands is poorest in southern Finland (Rassi et al., 2010). In the south peatlands are mainly privately owned, whereas in the north the majority of peatlands are owned by the state.

Finnish peatlands have been used for centuries: they have been transformed by agricultural use, while peat extraction for energy use started in the 20th century. In the 1960s and 1970s the government paid for ditching to increase timber production (Ministry of the Agriculture and Forestry, 2011). More than half of the peatland area have been drained for forestry and less than one percent is used for peat extraction (Turunen, 2008). However, recently, drainage for forestry has almost ceased (Rassi et al., 2010), whereas peat extraction threatens many large valuable peatlands. Peat extraction has caused conflicts over water quality and biodiverse areas between industry and nature-oriented non-governmental organizations (NGOs) (Jokinen et al., 2016). Though, water quality is not in the main focus of this study. Also questions on how to consider carbon storage or intact peatland area, which is not necessarily very biodiverse, are not agreed. 'Everyman's right' means that anyone can walk or ski on peatlands, pick berries or camp temporarily; peatlands are widely used for recreation and have cultural values.

Many policy instruments are used to govern peatlands. Environmental permits for peat extraction based on the Environmental Protection Act (EPA, 527/2014) prevent actions that are harmful to nature and reduce harmful effects. The Nature Conservation Act (NCA, 1096/1996) is the main act preserving biodiversity. For example nature conservation programmes and regulation concerning strictly conserved nature values (e.g. listed species) prevent actions that alter nature. Previous peatland conservation programmes were made in 1979 and 1981. Land-use planning is guided by spatial planning instruments; in this study, important instruments are the National Land-Use Objectives and the Regional Plans, according to the Land Use and Building Act (132/1999). The Forest Biodiversity Programme (Government of Finland, 2014, 2008) offers voluntary participation opportunities for conservation in forest areas that match ecological criteria. It has succeeded in overcoming social conflicts in conservation (Paloniemi and Varho, 2009). Environmental subsidy agreements and nature management projects offer landowners incentives to improve their land. Peatland restoration aims to restore hydrological aspects of the land to facilitate the development of vegetation toward its natural state.

2.2. Peatland conservation policy and actors in Finland 2009–2015

Next, we present key policy changes during 2009–2015. The composition of parties in Finnish governments altered during the study period (Table 1). In February 2009, the Minister of Agriculture and Forestry (the Centre Party) appointed a working group to prepare a national strategy for the sustainable use of peatlands. The working group consisted of several actors from different interest groups (Table 2). Economic sector institutions and energy sector advocacy organizations were included. The working group published a Peatland Strategy in February 2011 (Ministry of the Agriculture and Forestry, 2011).

The Government Resolution on the Sustainable Use and Protection of Peatland (from here on Government Resolution) was accepted by the government on 30 August 2012. The Government Resolution was based on the Peatland Strategy. Notably, a new statutory Peatland Conservation Programme for about 100,000 ha was proposed and its planning process started in 2012. Its preparations started with a new group (Table 2). Participants were partly from the same background organizations as those in Peatland Strategy but included ecologists from universities and fewer actors from economic sector.

In autumn 2014, dramatic changes took place in peatland policy after the Greens left the government and the Minister of the

Table 1

Finnish governments 2007 to 2017. First mentioned party is the party of the head of the government.

Time period	Head of the government	Parties
April 2007 to June 2010	Matti Vanhanen	Centre Party, National Coalition Party, Greens, Swedish People's Party
June 2010–22 June 2011	Mari Kiviniemi	Centre Party, National Coalition Party, Greens, Swedish People's Party
June 2011 to June 2014	Jyrki Katainen	National Coalition Party, Social Democratic Party, Left Alliance (left the government 2014), Greens, Swedish People's Party, Christian Democrats
June 2014 to May 2015	Alexander Stubb	National Coalition Party, Social Democratic Party, Greens (left the government 2014), Swedish People's Party, Christian Democrats
From May 2015	Juha Sipilä	Centre Party, Finns Party (– 2017) and National Coalition Party, Blue Reform (2017 –)

Table 2

Working group members of the Peatland Strategy and the Proposal for Conservation Programme. Actors from groups marked with an asterisk presented a differing or supplementary opinion to the main document.

	Peatland Strategy	Proposal for Conservation Programme
Ministry of the Environment	X	X
Ministry of the Agriculture and Forestry	X	X
Ministry of the Economic Affairs and Employment	X	
Ministry of the Finance	X	
Environmental authority (especially ELY-Centre)	X	X
Forest authority (Metsähallitus ^a and Forest Centre)		X
Sectoral research institutes	X*	X
Ecologists from universities		X*
Environmental non-governmental organizations	X*	X*
Regional council	X	X
Tapio ^b	X	X
External legal expert ^c	X	
Central Union of Agricultural Producers and Forest Owners	X	X
Energy sector advocacy organizations (Finnish Energy and Turveteollisuusliitto)	X	

* These were: Kotiaho, 2015; Lindholm, 2011; Sulkava, 2011; Sulkava and Savola, 2015.

^a Metsähallitus (Forest and Park Service) governs both conserved and economically used state owned land.

^b Tapio provides consulting solutions for efficient and sustainable forest management and bioeconomy for both the public and private sectors.

^c One of the authors: AE.

Environment changed from Ville Niinistö to the National Coalition Party's Sanni Grahn-Laasonen. One of her first decisions was to put on hold the preparations for the Peatland Conservation Programme. This happened just before the planned official landowner hearing following the NCA (section 8) hearing procedure. In October 2014, the Ministry of the Environment announced that the new minister was investigating whether peatland conservation could be advanced on the basis of voluntariness. The announcement led to intense criticism in the media (Albrecht and Åkerman, 2016). Grahn-Laasonen (2014) argued in her blog that the reason for stopping preparation was that her predecessor 'had not respected common will to investigate possibilities to proceed with voluntary actions ...'. A subgroup of the Proposal for Conservation Programme working group was tasked to investigate voluntary approach.

A survey of landowners possessing identified valuable peatlands was carried out in spring 2015, with a 42% response rate. It found that 47% of the landowners were positive towards the conservation of their own peatland through some means (e.g. negotiations on establishing private conservation areas, selling land or changing land) (Alanen and Aapala, 2015). The Proposal for Conservation Programme (Alanen and Aapala, 2015) was published in autumn 2015. It only recommended voluntary

actions. Simultaneously, with the Centre Party becoming the leading party in the government, it was decided that the budget for the acquisition of and compensation for conservation areas should be halved from 2016 onwards. Similarly, it was also decided to halve the money that could be granted for restoration. Still, the protection of 6000 ha of state owned land was put forward, and it was planned that about 30,000 ha more of state owned land should be protected in future.

2.3. Policy documents and analysis

We did interpretative policy analysis using policy documents and environmental legislation as central data. We used a case study approach drawing on different sources and methods (Yin, 2014). A case study investigates in depth a contemporary phenomenon, which boundaries might not be clear (Yin, 2014, p. 16). Our analysis was interpretative focusing on meanings contextualized in Finnish peatland policy development (Yanow, 2007). Among others, Yanow (2007) has argued that researcher reflectivity is central in interpretative policy analysis, which can be used to make sense of the implementation processes of policies and to increase understanding of the role of human agency. Accordingly, our reflection and interpretation focused particularly on the representations of nature in policy documents. We followed peatland policy preparation by examining the scientific literature, web pages of the Ministry of the Environment, blogs of the two Ministers of Environment, social media and public discussions in newspapers. We observed participants through attending seminars (How to Use Peatlands Sustainably? 21 January 2014; Are There Enough Peatlands? A Middle Term Check of the Peatland Strategy, 18 March 2015; Peatland in the Bioeconomy World, 2 February 2016) and discussion with some actors (authorities, researchers) who have participated in the peatland policy processes. One of the authors (AE) was an external legal expert member in the Peatland Strategy working group.

To get detailed information on participants in policy preparation, representation of nature and changes in policy instruments, we undertook a detailed analysis of two strategic policy documents – the Peatland Strategy (Ministry of the Agriculture and Forestry, 2011) and the Government Resolution (Government of Finland, 2012) – and a policy preparation document – Proposal for a Conservation Programme (Alanen and Aapala, 2015) (Fig. 1). The documents help us to understand government practices (Freeman and Maybin, 2011).

As a first step in policy document analysis, we analysed the content of three documents with ATLAS.ti software (version 7.1.5). To trace how nature was represented, we operationalized climate change and nature by coding it into four categories: (1) any mention of species or (a narrow definition of) biodiversity, (2) references to climate change, (3) references to ecosystem services, and (4) references to landscape networks. The last category refers to a more comprehensive definition of biodiversity than only species, for example networks, ecological connectivity, water catchment basins etc. We described the general opinions of the central actors towards peatland use (for peat as a fuel) based on the actors' own publications if possible, and our observations which were backed up by other existing literature (Table 3). Here we included some materials from 2016 and 2017. A blog of Grahn-Laasonen (2014) didn't mention peat and therefore her opinion is not

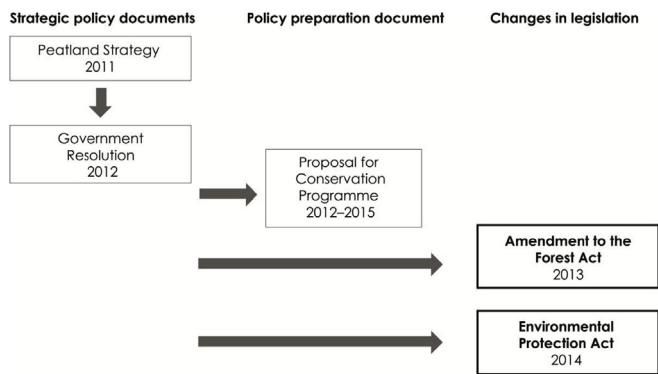


Fig. 1. Key peatland policy documents and key changes in Finnish legislation in the period 2009–2015. The publication year of the documents is shown, except for the Proposal for Conservation Programme we show the preparation time.

Table 3

Actors' and organizations' opinions on peat use (last column). These are researchers' deductions based on the material listed in the article. Examples of rationales (last column) are from actors' own publications, and from others' publications, listed in the References column. Note that individuals within the organizations can have differing opinions and opinions can change.

Organization/actor	References	Example excerpt	Opinion on peat use and conservation: examples of rationales
Environmental non-governmental organizations (NGOs)	^a Sulkava, 2011. ^a Sulkava and Savola, 2015. ^b Albrecht and Åkerman, 2016. ^b Lindholm, 2011.	<i>Strategy doesn't deal with [international] climate policy reality; even from viewpoint of national policy it ignores e.g. the climate and energy policy future report. It is totally unrealistic and 'burying one's head in the sand' to have national decisions with a starting point of continuing peat burning forever (Sulkava, 2011)</i>	Conservation (most strict) all ecosystem services are not conserved, energy subsidies for peat are irresponsible, partly ditched peatland can be valuable, the conservation of valuable mires and ecological network should be secured, water emissions are problematic
Ecologists from universities	^a Kotiaho, 2015.	<i>The preliminary estimation for need for new conservation area was 100,000 ha (Kotiaho, 2015)</i>	Conservation (most strict) The current level of nature conservation is not enough, voluntary conservation is not efficient
Minister of the Environment Ville Niinistö (the Greens)	^a Niinistö, 2013.	<i>The peat burning policy of the Greens is clear: peat use must be systematically decreased and it should be substituted with domestic renewable energy sources (Niinistö, 2013)</i>	Close down peat use no valuable mires should be used for peat extraction, a systematic decrease in peat use and substitution in the future, emissions to water to be minimized
Ministry of the Environment and Environmental Administration	^b Lindholm, 2011.	<i>Mire nature was only defended by the environmental administration [and NGOs in Peatland Strategy work] (Lindholm, 2011)</i>	Peat extraction is harmful more conservation, less carbon dioxide emissions
Sectoral research institutes (work under different ministries) Metsähallitus	^b Sulkava and Savola, 2015.	<i>... proposal of Metsähallitus, which greatly and arbitrarily differs from all principles of defining borders of nationally valuable peatlands, which were agreed earlier in the working group (Sulkava and Savola, 2015)</i>	Varies: Close down peat use - Not against peat extraction Not against peatland use
Ministry of the Agriculture and Forestry	^b Lindholm, 2011. ^b Sulkava and Savola, 2015.	<i>... the strategy [the Ministry led Peatland Strategy work] is a traditional strategy of use, aimed at striking a deal on continuing the culture of peatland use of the past decades also in the coming decades (Lindholm, 2011)</i>	Not against peat extraction
Ministry of the Economic Affairs and Employment	^b Albrecht and Åkerman, 2016. ^b Lindholm, 2011.	<i>In the late 1990s, the erstwhile Ministry of Trade and Industry commissioned a report where peat was defined as a slowly renewable resource (Lindholm, 2011)</i>	Not against peat extraction slowly renewable biofuel, slowly renewable resource
Minister of Agriculture and Forestry Sirkka-Liisa Anttila (the Centre Party)	^a Anttila, 2008.	<i>Peat forms a part of our domestic energy security. It has a position in our energy palette (Anttila, 2008)</i>	For peat extraction domestic energy security
Central Union of Agricultural Producers and Forest Owners	^b Maaseudun tulevaisuus, 2012.	<i>We must get political support for sustainably using Finland's biomass and for green growth. Facts from natural sciences are on our side. (Chair of the Central Union of Agricultural Producers and Forest Owners in an article on continuing peat extraction, Maaseudun tulevaisuus, 2012)</i>	For peat extraction domestic energy source, peat extraction can be done sustainably
Energy advocacy organizations	^b Albrecht and Åkerman, 2016. ^b Lempiinen, 2017.	<i>We would have personnel to change the diapers of our elderly people, if we only would decide to 'lift Finland from the bog' with the peat stored in Finnish peatlands. Peat lobbying campaign 2017 of the Bioenergy Association of Finland, Lempiinen, 2017)</i>	For peat extraction no emissions to water from extraction, produces jobs, valuable under-used natural resource, domestic energy security

^a Organization's or actor's own definition of opinion towards peat use.

^b Others' definition of organization's or actor's opinion.

listed in the table.

We coded policy instruments defined by the Peatland Strategy from policy documents and traced the EPA's path, as its role had grown significantly by the end of our study. Next, we described changes in policy instruments in three policy documents. Furthermore, we described which instruments were actually implemented. We examined the main changes in environmental legislation such as the Amendment to the Forest Act (1085/2013), the EPA, the Land Use and Building Act, the NCA, and the Temporary Act on Sustainable Forestry Works Subsidies (34/2015). In addition, we identified expected policy consequences and the main criticism presented by the participants from differing and supplementary opinions. All these opinions except for Lindholm (2011) were published as parts of the policy documents which we analysed. We are not aware of any published criticism of the Government Resolution written by the participants. We translated all the Finnish documents into English.

Table 4
Proposed combination of policy instruments and main criticisms from the participants.

Document	Proposed combination of policy instruments and means	Main criticisms of preparation and potential implications
Peatland Strategy (Ministry of the Agriculture and Forestry, 2011)	Wide and versatile portfolio of instruments Four main: The scale of the natural state, increasing weight of spatial planning, mechanism for voluntary change of land and accounting system for peatland Also: Restoration, Peatland Conservation Programme, Forest Biodiversity Programme, add habitats to the Nature Conservation Act, sustainability guidelines	Ecologically not sustainable, restoration too abstract, scale of the natural state based only on ditches, legal evaluation did not reflect the opinions of all the groups, international climate policy was ignored and the claim was made that peat would be renewable (Sulkava, 2011). Composition of working group, insufficient ecological understanding, definition of peat as a slowly renewable resource because of political purposes, continuation of business as usual (Lindholm, 2011).
Finnish Government Resolution on the Sustainable Use and Protection of Peatland (Government of Finland, 2012)	Wide and versatile portfolio of instruments Guiding use to altered areas, improving the state of peatlands (restoration, Peatland Conservation Programme and Forest Biodiversity Programme), decrease emissions, development of legislation, increasing the weight of Regional Plans, sectoral guidelines, improve climate change knowledge, decrease the use of peat, voluntary change of land	
Proposal for Conservation Programme (Alanen and Aapala, 2015)	Only voluntary instruments Forest Biodiversity Programme, restoration, communal forest and revising borders, guidelines to private and state's forestry areas and some other sectoral guidelines	Reducing the variety of instruments, cutting funds, not achieving the conservation level written in the government programme, if only voluntary conservation used - it is against constitutional law, use of voluntary instruments would require a larger area to achieve the same ecological values, temporary conservation is expensive, political watering down of the implementation of the Peatland Conservation Programme (Kotiaho, 2015). Political decisions prevented work towards the original assignment, preparation of the conservation programme was thrown into a rubbish bin, voluntary conservation is not actively advanced, possibilities in state land are not fully used; supplementation of conservation is a torso (Sulkava and Savola, 2015). Potential conflict –conservation aims identified but implementation uncertain (Evaluation of the proposal, Alanen and Aapala, 2015).

3. Results

3.1. What kinds of representations of nature did the policy process produce?

In this section, we discuss how the policy documents represent nature. The Peatland Strategy had environmental, social and economic aims which were reflected in the document's representation of nature. Securing the maintenance of adequate energy supplies and decreasing harmful effects to nature were both highlighted. The strategy claimed that it used an ecosystem service approach. However, under the ecosystem service headings there were more traditional ways of describing the use of natural resources: biodiversity conservation (named as a class of 'conservative services', e.g. genetic, species and habitat diversity), economic use (provisioning services, e.g. timber and edible natural resources), emissions to water and air (regulating services, e.g. carbon capture and storage, water purification and flood regulation) complemented by recreation and teaching (cultural services, e.g. tourism and well-being). Peat was classified under provisioning services and as a slowly renewable. Nature was understood holistically; this included an aim to plan conservation and use simultaneously on a nationwide scale. A need to 'save examples of peatland nature as a regionally and ecologically comprehensive and functioning network' was justified by ecological knowledge e.g. by national evaluation of the status of peatland habitats and the Red List of species (Rassi et al., 2010). However, the use of peat was encouraged and justified by energy security. The representation of nature was the result of a consensus of opinions on peat use ranging from those who wanted strict conservation, i.e. no peat extraction, to those who promoted peat extraction, and those somewhere in between, such as the leading organization the Ministry of the Agriculture and Forestry (Tables 2 and 3).

The ecosystem service approach and 'environmental, social and economic objectives' of the Government Resolution were adopted from the Peatland Strategy. On the contrast, there was an aim to

systematically decrease the use of peat, because of the harmful emissions peat extraction produces. Knowledge on the need for conservation and the importance of landscape networks was also apparent, for example in proposals for not using the most valuable areas and for enhancing the network of conservation areas. The Government Resolution aimed to decrease harmful effects on water and air (ecosystem services) and to improve the provision of multiple services. It was recognized that protected areas produce cultural, supporting and regulating services. Several cultural ecosystem services were mentioned. More specific consideration was given to production services, especially in forestry and agriculture, and some consideration was given to tourism and berry picking.

The Proposal for Conservation Programme was a prioritization for conservation. The overarching idea was to preserve natural habitats that produce ecosystem services. Though, ecosystem services and climate change played a smaller role in the text of the document. Unlike the two earlier documents, the representation of nature was based on more detailed and comprehensive ecological knowledge; for example, the introduction started with a mention of the threat statuses. The proposal especially considered landscape networks; a central concept was supplementation of the existing conservation network. Almost 300,000 ha of peatland was analysed and sites were given points based on agreed nature values criteria. These criteria included the regional level of ditching and percentage of protected areas (weight 15%), and special nature values: habitat types (35%), species (10%), undrained area (10%), connectivity (10%), geomorphological aspects and other special characteristics (20%). The central data for the preparation of the conservation programme were obtained from new field surveys (habitats, threatened species and special nature values) from summers 2013 and 2014 on 176,000 ha of valuable areas, but new systematic species inventories were not undertaken. Systematic examination of pre-existing regional inventories, aerial photos, and databases was also done. Spatial conservation prioritization analysis, which considered the

preservation of existing peatland biodiversity, connectivity of sites and their degree of natural state, was conducted with the Zonation software. Areas that were proposed to be conserved were selected based on nature values points (49% of area), Zonation analysis (31%) and by expert evaluation (21%). The representation of nature in the document was the result of a consensus of a working group, but compared to the Peatland Strategy there were not such strong interest differences between the participants, especially because energy advocacy organizations were not included (Tables 2 and 3).

3.2. What kinds of policy instruments did the policy process produce and what implications could they have?

In this section, we look closer at the policy instruments which were proposed in different documents and also identify the expected policy consequences and main criticism from the participants (Table 4). In addition, we describe which instruments were implemented in practise during the policy process.

A wide portfolio of instruments was presented in the Peatland Strategy (Table 4). The main proposed improvements to conservation were increasing the weight of Regional Plans and to 'Put to use the regionally proportional scale of the natural state in allocating the use which would alter peatland significantly (i.e. to develop a general nature values classification).' The idea was to guide use away from peatlands which have the most natural water balance and the least altered vegetation, and to select areas that are closest to the natural state for protection and restoration. Interestingly, advocacy groups aimed to include other than ecological experts in defining the natural state: 'It is important that different stakeholder groups participate in the classification process. To ensure the acceptability of the procedure, the preparation aims to be broad and open especially in the beginning of the process.' Developing a mechanism for the voluntary change of land was also a means to guide the use to altered areas. Spatial planning and enhancing accessibility were planned to enhance recreation opportunities and other cultural services. Using only altered areas was presented to advance water and climate emissions control targets. In contrast, peat extraction was defended. The Peatland Conservation Programme was proposed to cover 100,000 ha based on preliminary evaluation. Instruments also included voluntary (peatland forest) conservation with the Forest Biodiversity Programme. Preliminary evaluation of developing legal instruments was presented; the main focus was to include peatland habitat protection in the NCA (to section 29). Not suggesting to use the Environment Protection Act for peatland conservation was justified by that efficient protection would require adding nature or scenery conservation considerations to environmental permits, and this would lead to extra costs for applicants and the administration. Renewal of the Forest Act (1093/1996) was discussed elsewhere in the strategy, for example, to add new types of peatland with special values (to section 10 of the Forest Act) and to remove the obligation to regenerate forests in certain situations.

Implications and criticisms: The sustainable use outlook to 2050 at the end of the Strategy visions that human wellbeing will be maintained and increased by utilising ecosystem services; favourable conservation results will be achieved, unprofitable peatland forests will not be in active forestry use and peat will be used as domestic energy source. Lindholm (2011) claimed that the Strategy was 'a collection of purposeful texts explaining the activities of the writers', all forms of economic use of peatlands were present but the group had insufficient knowledge of basic peatland ecology. Sulkava (2011) criticized, for example, the scale of the natural state because it was based only on ditches, and that overall the Strategy was not be ecologically sustainable.

The Government Resolution echoed most of the same means as the Peatland Strategy (Table 4), but aimed to systematically decrease peat extraction. Therefore, its instruments were better aligned with the prevailing international climate change halting policies and the biodiversity conservation aims. The scale of the natural state was stated to be

the basis for allocating the use of altered peatlands. Related to this, a working group (consisted of the authorities, sectoral institutes researchers, NGOs, and also energy advocacy organizations, the Regional council, and the Central Union of Agricultural Producers and Forest Owners) was appointed to advise on implementation of the scale and their private reports were given to the Ministry of the Environment in 2013. Development of the legislation in the Government Resolution included examining possibilities to change the EPA: to add nature values and Regional Plans considerations, clarify environmental permits, and add peat extraction sites of less than 10 ha in size to the EPA. Also, examining whether peatland habitats should be added to the NCA and the renewal of the Forest Act were considered. The Peatland Conservation Programme was planned to be completed at the end of 2014. Increasing the weight of Regional Plans was presented, and evaluation of the Land Use and Building Act was planned to include evaluation of peatland use guidance. Using the Forest Biodiversity Programme for peatland conservation and developing mechanisms for the change of land were also planned. Other voluntary actions included restoration of the water balance by redefining borders of conservation areas, and expanding them. Spatial planning and collaboration of landowners and other actors were planned to enhance the use of cultural services.

Implications: In the Government Resolution, the environmental consequences were evaluated to advance conservation of nature values. It was stated that in the long term, harmful impacts to biodiversity and water would decrease and ecosystem services would be maintained.

Implementation of the legal instruments made the strategic documents actionable. The Amendment to the Forest Act came into force on 1st January 2014. The Act included the removal of the obligation to regenerate forests in ditched non-profitable areas or when there is an official plan to restore originally open or sparsely forested peatland. It also included the addition of peatland habitats to habitats with special values (section 10), and provided allowance for continuous growth. The Environment Protection Act was amended and came into force on 1st September 2014. It became possibly the most important instrument that governs peatland biodiversity by allowing the granting of peat extraction permits only when nationally or locally significant nature values will not be destroyed (section 13). This means that permits will only be granted when the natural state of a peatland is significantly altered because of drainage. When evaluating the significance of the change, changes in vegetation, water control and existence of ditches will be considered. There were no exceptions for small extraction sites (earlier, sites less than 10 ha did not require a permit). The Act also considers locally valuable peatlands, not only those that are nationally or regionally valuable.

The Proposal for the Conservation Programme contained comprehensive knowledge of nature but this was not aligned with the proposed policy instruments (Table 4). Overall, the way the Peatland Conservation Programme was discussed was controversial – a proposition to conserve 117,000 ha of the nationally most valuable areas that supplement the best conservation networks was made, but there were no plans for its full implementation. On private lands, only voluntary conservation instruments were proposed. Restoration, the Forest Biodiversity Programme, establishing communal forests and revising borders are examples of these. However, it was also noted that plans were made to halve the money available. Proposed conservation areas were situated in southern Finland but, on the contrary, planned implementation was focused on state owned land and in northern Finland. Recommendations were made to use existing spatial planning instruments more diversely. Some instruments and guidelines for preserving carbon storage were recommended, but these were quite abstract or the same as for biodiversity.

Implications and criticisms: Evaluation of the proposal (only a summary published) stated that only about 40,000 ha will be conserved in practise in the short term. On the other hand, the addition of 120,000 ha protected areas was evaluated to make clear improvements compared to the current state. Some (unspecified) ecosystem services

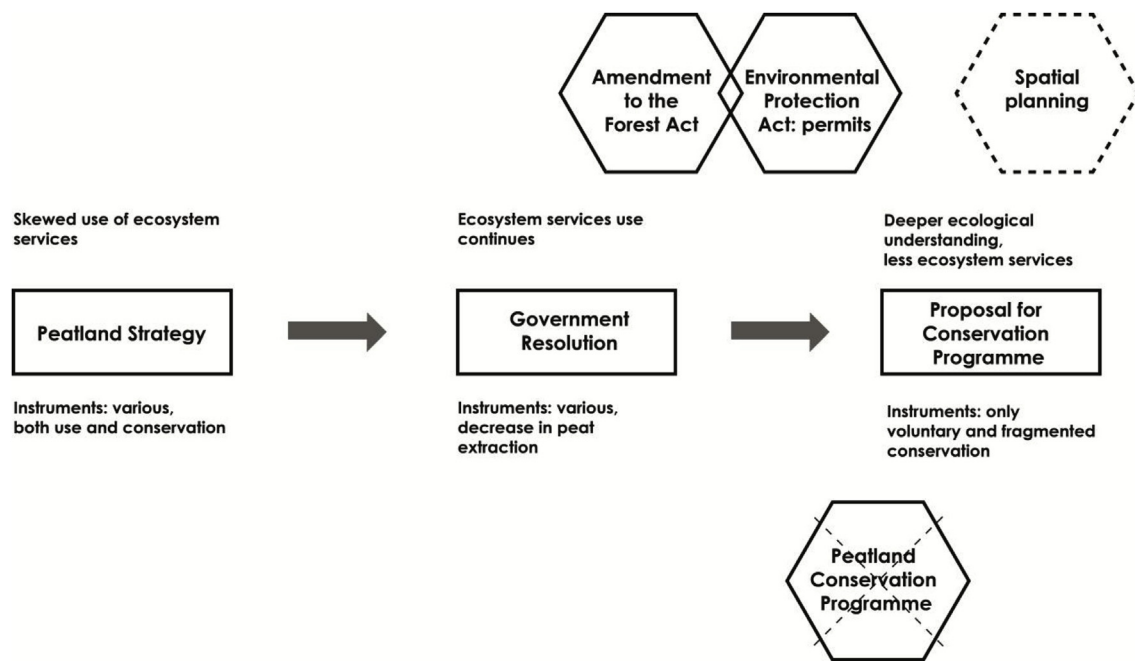


Fig. 2. The development of Finnish peatland policy. The conservation policy instruments which were implemented (without a cross) or disappeared (marked with a cross) in the period 2011–2015. Spatial planning for conservation of peatlands was not as binding as planned. The main changes in the representation of nature and in the proposed instruments in the analysed policy documents are summarized.

were evaluated to be lost without the proposed Peatland Conservation Programme. Nonetheless the summary stated that not all the areas suggested for protection would be lost even without supplementation programme, because there are not that many economic uses for many peatlands. A main criticism from the long lists by Kotiaho (2015) and Sulkava and Savola (2015) was that the implementation of the Peatland Conservation Programme would have been politically watered down.

The peatland conservation policy process from 2009 to 2015 was not linear but messy. The main changes in the representation of nature and in instrument combinations in the documents, as well as the instruments that were implemented and those that vanished are summarised in Fig. 2. EPA was the main new instrument, the NCA was unchanged. Forest regulation was renewed with an assumed slightly positive effect on peatland biodiversity. Subsidies could be given for restoration, but also for remaking ditches based on the Temporary Act on Sustainable Forestry Works Subsidies. The Forest Biodiversity Programme remained throughout the policy process. The planned Peatland Conservation Programme disappeared from the instrument portfolio. Spatial planning did not gain more strength to protect biodiversity, instead it also highlighted peat extraction (Ministry of the Environment, 2015).

4. Discussion

In this study, we have described the interactions between the representations of nature and policy instruments in Finnish peatland conservation and management policy process. We have illustrated how the selection of policy instruments and their implementation can change radically. This case adds to understanding the connections between political struggles over environmental resources, cultural meanings attached to the environment and environmental change (Nygren and Rikoon, 2008). The representation of nature in documents appeared to be an outcome of political debate and struggle. The battle between the policy makers and other actors who had different interests and values (van Kerkhoff and Lebel, 2006) led to a specific policy instrument mix. Representations of nature in discussions can have effects e.g. on research policy implementation (Kwa, 1987). As stated by van Kerkhoff and Lebel (2006) 'relationships between research-based

knowledge and action can be better understood as arenas of shared responsibility, embedded within larger systems of power and knowledge that evolve and change over time'. Understanding such aspects are essential for improving adaptive shared natural resource management (Adams et al., 2003; Williams, 2011).

Nature was represented differently in the three policy documents. The representations reflected the purpose of the document and the consensus of participants' values on the management. Documents 'embody the political processes by which they are produced' (Freeman and Maybin, 2011). The Peatland Strategy working group included actors with differing interests in peat use, and as a result the ecosystem services approach was only partial and enabled the continuation of peat extraction. Peat was defined as an ecosystem service and as being slowly renewable despite its renewal time is outside the societal time-scale. Also defining biodiversity as one ecosystem service class, not as the base for all services, is not compatible with the widely-accepted definitions (European Environment Agency, 2016; Millennium Ecosystem Assessment, 2003). Ambiguous concepts like ecosystem services can be interpreted differently, which leaves room for their politically coloured use. In the Government Resolution, the functionality of nature was considered and peat extraction was planned to be decreased; thus, it is worth arguing that the combination of representation of nature and implementation means were cohesive. The representation of nature in the Proposal for Conservation Programme was strongly ecological. Accordingly, there were participants in the working group with a high level of ecological knowledge and few parties from the economics sector. However, political support for implementing the planned Peatland Conservation Programme, building on a systematic prioritization of the most valuable areas and covering (at least) 100,000 ha, disappeared during the preparation of the document.

It seems that results from the Proposal for Conservation Programme and the landowner survey were run over by a power struggle (see also Albrecht and Åkerman, 2016). Also other factors apart from evidence, such as competing interests and values, contribute to the policy process (Rose, 2015). In the policy process mainly voluntary instruments remained, but because partly targeted only to forest areas and because of insufficient and further decreased funds they will not be not enough to maintain landscape networks. Thus, the focus area and extent of

conservation changed dramatically during the process. It is difficult to voluntarily conserve ecological entities like peatlands, because conserving only a part of water body is often not effective. The main new peatland conservation was based on the EPA permits. Notably, however, the EPA protects peatlands only from peat extraction, not from all uses. Decisions for ‘conserving’ a site are made when applications are made for permits. The preserved areas are thus random and it is not known what will be protected before permit applications are made. Future interpretation of the significance of alteration from the natural state is important for what the EPA means in practise. Definition of alteration is based on drainage and ‘naturalness of vegetation’ which are not defined in detail. Peatland, which is degraded based on the scale, can still have vital populations of peatland species. From a legal point of view, it would have been possible to include detailed ecological information into the definition, but as a result of the political process it was not. Generally, nature values have relatively weak legal protection in the EPA, because its purpose is the prevention of discharges, and only very rarely are any other than explicitly and strictly conserved nature values considered (Ekroos and Warsta, 2012). Peat excavation is an exception to this basic rule. Alternatively, the qualities of good locations for nature-changing actions could have been described in more detail in the EPA (Ekroos and Warsta, 2012). A holistic management approach could be implemented for example by strengthening of the role of ecology in land-use planning systems, and in particular using the green infrastructure approach, which is defined as a connected network that produces ecosystem services (Lennon and Scott, 2014; Salomaa et al., 2017).

The inclusion of interdisciplinary knowledge and participatory approaches has been seen as an important parts of policy processes (Haas, 2004; van den Hove, 2000). Participation showed some peculiar aspects in this conflicting peatland case. Firstly, landowners were not explicitly included in the preparation even when they were used as a rationale by the Minister of the Environment. The use of more or less only voluntary means was defended as being due to landowners' freedom, but their opinions were not heard in the official hearings. Landowners' relatively wide positive opinions towards conservation were not reflected in the conservation opportunities; funding for voluntary conservation decreased. Secondly, actor groups had a variety of opinions and conflicting interests, which seemed to lead to dubious practices. A right to collaborative decision-making was used as a reason to include advocacy groups when defining criteria for the natural state. It is a political decision to *what extent* society wants to protect nature, but the *definition of the natural state* is not. We argue that the natural state should be judged based on the latest scientific knowledge, not deliberated by advocacy groups. There was a lack of clarity in recognizing the correct stakeholders for various phases of the participatory process. It is also noteworthy that the only social scientists visible in documents were those whose role was to evaluate the social consequences of the proposal and their full report was not published during the study period. However, the aim to conserve the most valuable peatlands, which was a concept used throughout the policy process, is a valuation question. This central concept was not clearly defined. Relating results from the Proposal for Conservation Programme were not used in policy implementation. Some of the pro-conservation participants were dissatisfied with the content of the policy documents and wrote additions to documents to state their views. General controversy of opinions for and against peat was visible also in public web discussion in 2013 (Salomaa and Paloniemi, 2014). Even though agricultural and forest sector advocacy groups are powerful in Finland, nature conservation organizations have found ways to advance environmental goals. A participatory approach should be carefully planned to avoid a situation where powerful parties advance their own aims (Albrecht and Åkerman, 2016). The events in peatland conservation policy indicated a move towards post-truth political actors, who are ready to manufacture their own facts (Lempinen, 2017; Lockie, 2017). However, it is debatable whether any knowledge can be value free. In these kinds of wicked resource allocation problems

all decisions include valuation. They are questions of balance between conservation - for its own sake or the common good - and the rights of property owners to use land. How values and power issues affect policy instrument selection in the management of natural resources should be the topic of future studies.

5. Conclusions

This case study disentangles how the management of environmental resources in policy process is not linear but messy. In cases of conflicting natural resources management as in the Finnish peatland case, ecological knowledge may be overrun by other aspects, such as various societal interests of powerful political or stakeholder groups. In this case, the use of the concept of ecosystem services was skewed. While the essential idea of ecosystem services, receiving various societal benefit from ecosystem processes, was emphasized, certain aspects such as biodiversity as one service class and referring to peat as a renewable provisioning service, blurred the use of the concept. Landowner participation was skewed as well; even though landowners were used as a reason for policy changes towards voluntariness, landowners did not have a chance to fully participate in the policy process. During the policy process, political interest in conservation decreased. It can be concluded that the correspondence of the identified need for conservation supported by ecological knowledge, and the implemented policy instruments decreased in the period 2009–2015. Knowledge of the most valuable areas obtained during the planning of the Peatland Conservation Programme could be used in the future. In participatory conflictual policy processes, the involvement of different actors needs to be systematically planned and integrated with the evidence-informed approach. Particular attention should be paid to power positions and lobbying resources in order to avoid the blurring of scientific knowledge (e.g. which is a natural state) with values and interests (such as how valuable a voluntary approach is) and to avoid an imbalanced involvement of stakeholders. Finally, a dynamic combination of policy instruments should be considered and their ecological implications should be evaluated systematically.

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